Use of UEA
In Daily Practice

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September, 2025

No Disclosures

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Objectives for talk

1. Challenges
2. Harmonics
3. Optimization
4. Safety and Comparison of agents
5. ASE: Papers to Guidelines and Standards
6. Cost and Efficiency
7. Future

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Challenges

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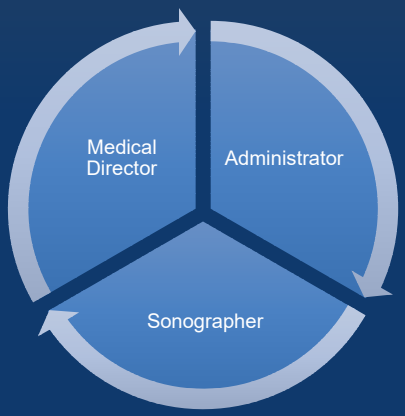
Challenges



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Challenges

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Objectives for talk

ASE: Papers to Guidelines and Standards

- **Need and statements**

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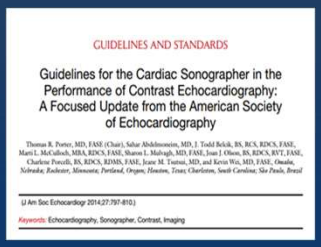
Challenges



GUIDELINES AND STANDARDS

Guidelines for the Cardiac Sonographer in the Performance of Contrast Echocardiography: A Focused Update from the American Society of Echocardiography

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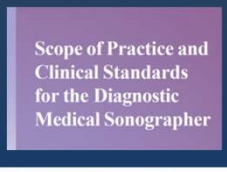
(J Am Soc Echocardiogr 2014;27:797-810.)

Keywords: Echocardiography, Sonographer, Contrast, Imaging



Scope of Practice and Clinical Standards for the Diagnostic Medical Sonographer

SCOPE OF PRACTICE REVISION PROCESS

In October 2022, representatives of 20 organizations came together to begin the process of revising the existing *Scope of Practice and Clinical Standards for the Diagnostic Medical Sonographer*. Thus began a process that engaged the participating organizations in an unrestricted dialogue about needed changes. The collaborative process and exchange of ideas has led to this document, which is reflective of the current community standard of care. The current participants recommend a similar collaborative process for future revisions that may be required as changes in ultrasound technologies and healthcare occur.

ENDORSING/SUPPORTING ORGANIZATIONS

The following organizations participated in the development of this document. Those organizations that have formally endorsed the document are identified with the "†" symbol. Supporting organizations are identified with the "*" symbol.

- AHRA: The Association for Medical Imaging Management (AHRA) †
- American College of Radiology (ACR) †
- American Institute of Ultrasound in Medicine (AIUM) *
- American Registry for Diagnostic Medical Sonography (ARDMS)/Inteleos *
- American Registry of Radiologic Technologists (ARRT) *
- American Society of Echocardiography (ASE) †
- American Society of Radiologic Technologists (ASRT) *
- Cardiovascular Credentialing International (CCI) *
- Committee on Accreditation of Advanced Cardiovascular Sonography (CoA-ACS) †
- International Contrast Ultrasound Society (ICUS) †
- Joint Review Committee on Education in Cardiovascular Technology (JRC-CVT) †
- Joint Review Committee on Education in Diagnostic Medical Sonography (JRC-DMS) †
- Society for Vascular Medicine (SVM) †
- Society for Vascular Ultrasound (SVU) †
- Society of Diagnostic Medical Sonography (SDMS) †
- Society of Radiologists in Ultrasound (SRU) †

Note: *Some organizations have internal policies that do not permit endorsement of external documents. "Supporting organization" denotes a more limited level of review and approval than endorsement and means the organization considers the clinical document to be of educational value, although it may not agree with every recommendation or statement in the document.*

OTHER PARTICIPATING ORGANIZATIONS

The following organizations participated in the development of this document.

- American Vein and Lymphatic Society (AVLS)
- Intersocietal Accreditation Commission (IAC)
- Medical Imaging Technology Alliance (MITA)
- Perinatal Quality Foundation (PQF)

Bendick, P. J. (2015). Scope of Practice and Clinical Standards for the Diagnostic Medical Sonographer. Journal of Diagnostic Medical Sonography, 31(4), 197-197.

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Challenges

BASED ON ASE GUIDELINES AND STANDARDS DOCUMENTS

American Society of Echocardiography Guidelines and Recommendations for Contrast Echocardiography: A Summary for Applications Approved by the U.S. Food and Drug Administration

Compiled by: Jonathan R. Lindner, MD, Thomas R. Porter, MD, and Margaret M. Park, BS, ACS, RDCS, RVT

Address correspondence to:
Jonathan R. Lindner, MD
Cardiovascular Division, UHN-62, Oregon Health & Science University
3181 SW Sam Jackson Park Rd., Portland, OR 97239

Key Points:

1. The only FDA-approved use in cardiovascular disease is for LVO using IV injections.
2. All commercially-produced UEAs (Optison, Definity, Lumason) are encapsulated with albumin or lipid, and contain safe high-molecular weight gas.
3. UEAs have a range of average size between 1.1 and 4.5 μm, thereby allowing them to pass unimpeded through the pulmonary and systemic microcirculation.
4. There are agent-related differences in storage and pre-administration preparation protocols.

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Challenges

STANDARD - ANALYSIS AND DETERMINATION OF PROTOCOL FOR THE DIAGNOSTIC EXAMINATION:

1.3 The most appropriate protocol seeks to optimize patient safety and comfort, diagnostic quality, and efficient use of resources, while achieving the diagnostic objective of the examination. The diagnostic medical sonographer:

1.3.1 Integrates medical history, previous studies, and current symptoms in determining the appropriate diagnostic protocol and tailoring the examination to the needs of the patient.

1.3.2 Performs the examination under appropriate supervision, as defined by the procedure.

1.3.3 Uses professional judgment to adapt the protocol and consults appropriate medical personnel, when necessary, to optimize examination results.

1.3.4 Confers with the supervising physician, when appropriate, to determine if intravenous contrast is necessary to enhance image quality and obtain additional diagnostic information.

1.3.5 With appropriate education and training, uses proper technique for intravenous line insertion and administers intravenous contrast according to facility protocol.

Scope of Practice and Clinical Standards for the Diagnostic Medical Sonographer

STANDARD - EVALUATION OF THE DIAGNOSTIC EXAMINATION RESULTS:

1.5 Careful evaluation of examination results in the context of the protocol is important to determine whether the goals have been met. The diagnostic medical sonographer:

1.5.1 Establishes that the examination, as performed, complies with applicable protocols and guidelines.

1.5.2 Identifies and documents any limitations to the examination.

1.5.3 Initiates additional scanning techniques or procedures (e.g., administering contrast agents) when indicated.

1.5.4 Notifies supervising physician when immediate medical attention is necessary, based on examination findings and patient condition.

Bendick, P. J. (2015). Scope of Practice and Clinical Standards for the Diagnostic Medical Sonographer. Journal of Diagnostic Medical Sonography, 31(4), 197-197.

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2000: Cardiac Communication papers

- Performing an Echocardiographic Examination with a Contrast Agent - - Burgess, P.
- Achieving a Diagnostic Contrast-Enhanced Echocardiogram– Witt, S.
- Ultrasound Contrast Physics - - McCulloch, M.
- Contrast echocardiography: current and future applications - - Mulvagh, S.L.

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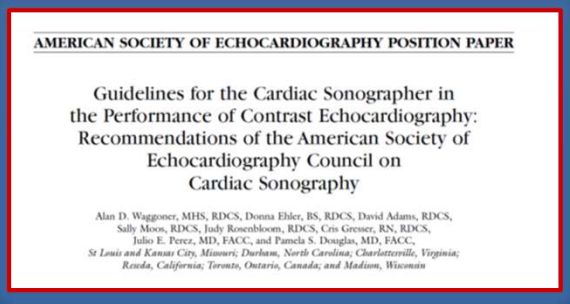
2001: ASE Position Paper



AMERICAN SOCIETY OF ECHOCARDIOGRAPHY POSITION PAPER

Guidelines for the Cardiac Sonographer in the Performance of Contrast Echocardiography: Recommendations of the American Society of Echocardiography Council on Cardiac Sonography

Alan D. Waggoner, MHS, RDCS, Donna Ehler, BS, RDCS, David Adams, RDCS, Sally Moos, RDCS, Judy Rosenbloom, RDCS, Cris Gresser, RN, RDCS, Julio E. Perez, MD, FACC, and Pamela S. Douglas, MD, FACC, *St Louis and Kansas City, Missouri; Durham, North Carolina; Charlottesville, Virginia; Reseda, California; Toronto, Ontario, Canada; and Madison, Wisconsin*

1. Understanding microbubble physics
2. Recognition of need
3. IV access
4. Image acquisition

Waggoner, A. et al. (2006). American Society of Echocardiography minimum standards for the cardiac sonographer: a position paper. JASE 19(5), 471-474.

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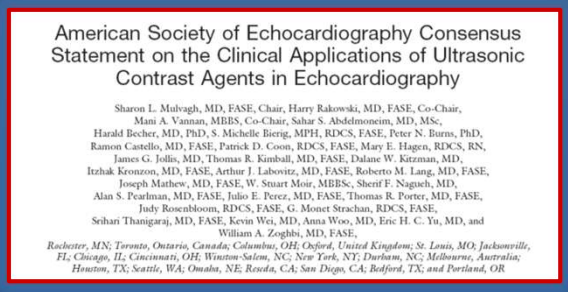
2008 ASE Consensus Statement



American Society of Echocardiography Consensus Statement on the Clinical Applications of Ultrasonic Contrast Agents in Echocardiography

Sharon L. Mulvagh, MD, FASE, Chair, Harry Rakowski, MD, FASE, Co-Chair, Mani A. Vannan, MBBS, Co-Chair, Sahar S. Abdelmoneim, MD, MSc, Harald Becher, MD, PhD, S. Michelle Bierig, MPH, RDCS, FASE, Peter N. Burns, PhD, Ramon Castello, MD, FASE, Patrick D. Coon, RDCS, FASE, Mary E. Hagen, RDCS, RN, James G. Jollis, MD, Thomas R. Kimball, MD, FASE, Dalane W. Kitzman, MD, Itzhak Kronzon, MD, FASE, Arthur J. Labovitz, MD, FASE, Roberto M. Lang, MD, FASE, Joseph Mathew, MD, FASE, W. Stuart Moir, MBBSc, Sherif F. Nagueh, MD, Alan S. Pearlman, MD, FASE, Julio E. Perez, MD, FASE, Thomas R. Porter, MD, FASE, Judy Rosenbloom, RDCS, FASE, G. Monet Strachan, RDCS, FASE, Srihari Thanigaraj, MD, FASE, Kevin Wei, MD, Anna Woo, MD, Eric H. C. Yu, MD, and William A. Zoghbi, MD, FASE,

Rochester, MN; Toronto, Ontario, Canada; Columbus, OH; Oxford, United Kingdom; St. Louis, MO; Jacksonville, FL; Chicago, IL; Cincinnati, OH; Winston-Salem, NC; New York, NY; Durham, NC; Melbourne, Australia; Houston, TX; Seattle, WA; Omaha, NE; Reseda, CA; San Diego, CA; Bedford, TX; and Portland, OR

1. Mechanics of both echo machine and microbubbles
2. Definition of Clinical Applications
   - Quantification of LV
   - Anatomy
     - Intracardiac
     - Extracardiac
   - Doppler Enhancement
   - Use in Stress Echo
3. Defined Roles
4. Safety
5. Cost effectiveness

Mulvagh, S. L., et al. (2008). American Society of Echocardiography consensus statement on the clinical applications of ultrasonic contrast agents in echocardiography. JASE 21(11), 1179-1201.

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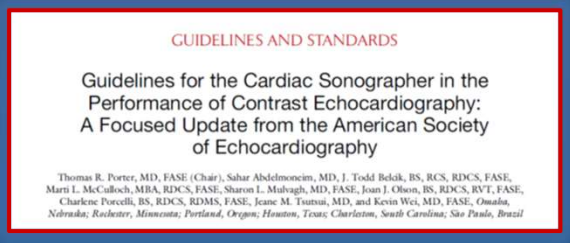
2014: ASE Guidelines



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1. Mechanics of both echo machine and microbubbles
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   - A. Quantification of LV
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   - C. Doppler Enhancement
   - D. Use in Stress Echo
3. Defined Roles
4. Safety
   - Shunts
   - PHTN
   - Agitated Saline
5. Cost effectiveness
6. Future developments

Porter, T. R., et al. (2014). Guidelines for the cardiac sonographer in the performance of contrast echocardiography: a focused update from the American Society of Echocardiography. 27(8), 797-810.

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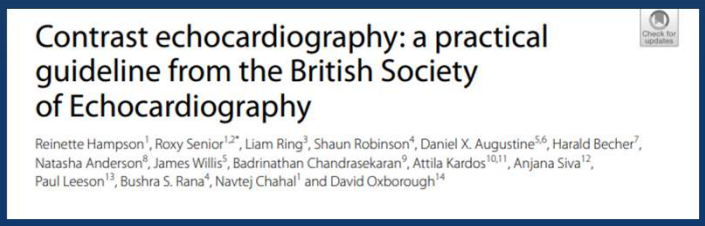
2023: BMC Guidelines


Contrast echocardiography: a practical guideline from the British Society of Echocardiography

Reinette Hampson[1], Roxy Senior[1,2*], Liam Ring[3], Shaun Robinson[4], Daniel X. Augustine[5,6], Harald Becher[7], Natasha Anderson[8], James Willis[5], Badrinathan Chandrasekaran[9], Attila Kardos[10,11], Anjana Siva[12], Paul Leeson[13], Bushra S. Rana[4], Navtej Chahal[1] and David Oxborough[14]

Hampson et al. Echo Research & Practice
https://doi.org/10.1186/s44156-023-00034-9

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Prominent Message

- **UCAs should be used whenever suboptimal images exist for the quantification of chamber volumes and ejection fraction and the assessment of regional wall motion.**
- **Suboptimal images are defined as the inability to detect two or more contiguous segments in any three of the apical windows.**
- **Doppler flow evaluations with UCAs should be performed on rest or stress studies if spectral signals to quantify velocities and pressure gradients were inadequate.**
- **Doppler enhancement with UCAs can be done in the same studies in which UCAs were used to improve LVO.**

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Objectives for talk

Harmonics

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The Past

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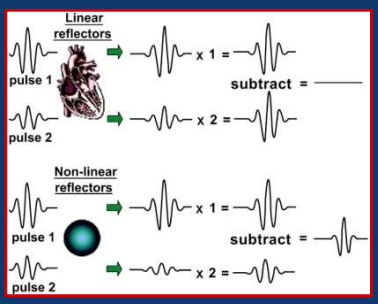
Harmonics

Power Modulation



Pulse Inversion

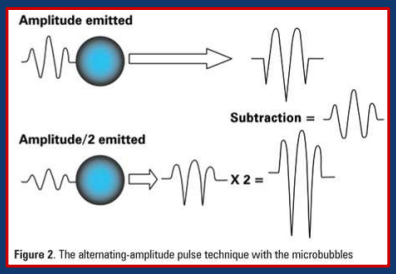


Figure 2. The alternating-amplitude pulse technique with the microbubbles

Porter, T. R., et al. (2014). Guidelines for the cardiac sonographer in the performance of contrast echocardiography: a focused update from the American Society of Echocardiography. 27(8), 797-810.

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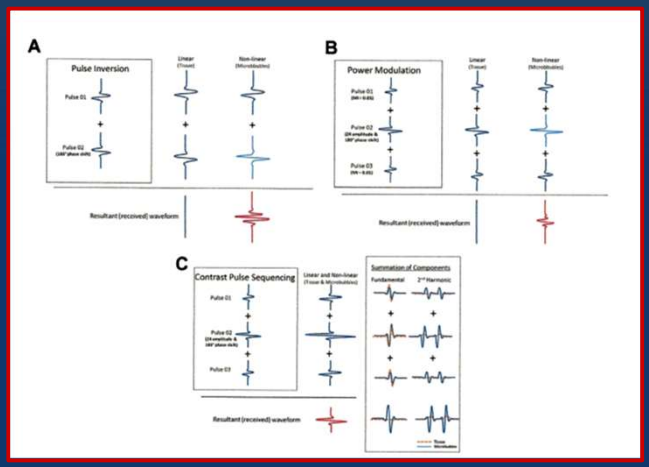
Harmonics



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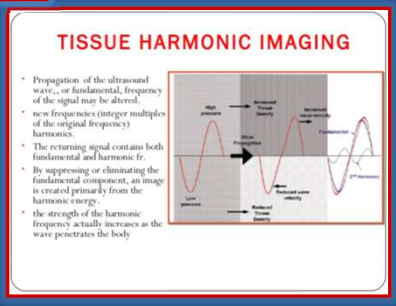
Harmonics

Table 1 Comparison of different low-MI imaging techniques

Descriptor	Company Manufacturer(s)	Tissue cancelation technique	Advantage(s)	Disadvantage(s)
Pulse-inversion Doppler and very low MI*	Philips Sonos/IE33 Toshiba Aplio/Xario GE 1.5-, 1.6-, and 1.7-MHz transducers	Alternating polarity	High resolution	Attenuation and dynamic range
Power modulation and very low MI*	Philips Sonos/IE33 GE 2.1- and 2.4-MHz transducers	Alternating amplitude	High sensitivity	Resolution, image quality, and dynamic range
Contrast pulse sequencing and very low MI*	Siemens Acuson	Both alternating polarity and alternating amplitude	Image quality and high sensitivity	Attenuation and dynamic range
Low-MI† harmonic (LVO)	All vendors	B-mode; no cancelation	Image quality	Decreased contrast sensitivity, apical swirling, and no perfusion

*Very low MI, <0.2.
†Low MI, <0.3.



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Objectives for talk

Optimization

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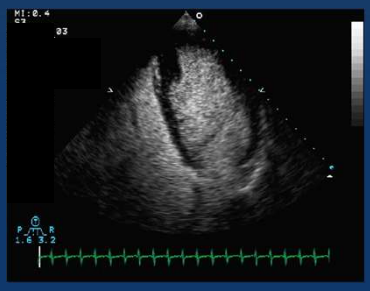
Optimization



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Optimization

- Default Power setting is <0.12 MI; lower MI's will be more sensitive
- Pen choice suppresses tissue the best particularly "septal stripe"
- Sometimes too much apical destruction though; if there is too much Apical destruction then move Focus up towards Apex
- Gen choice is most like ultraharmonics

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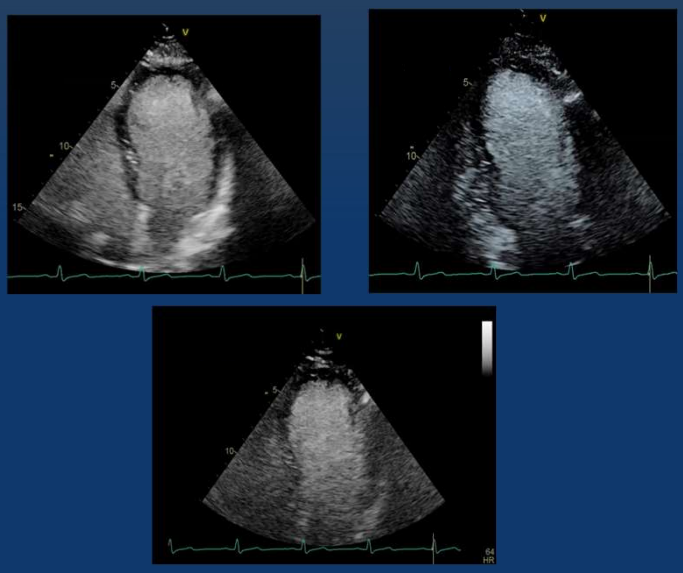
UEA: Which is Which?



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Optimization

- Default Settings for Contrast work well
- Turn up compression for softer appearance
- Use Chroma Maps if you like color overlay
- Gray maps will alter the look

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Optimization

LVO

Contrast-specific ultrasound imaging

Key points

1. There are two contrast imaging pre-sets available on the Philips and GE platforms: namely 'LVO/LV Contrast' (MI>0.2) and 'Low MI/Contrast Low MI' (<0.2).

2. The BSE recommends using 'Low MI' contrast specific imaging pre-set in the fundamental mode both for rest and stress imaging, if available and well optimized.

3. 'Low MI' in the fundamental mode provides excellent endocardial definition, allows low volumes of contrast usages, provides uniform opacification with minimum optimization and the simultaneous ability to assess perfusion.

4. The 'LVO' pre-set in the harmonic mode may be used (ideally fundamental mode) if 'Low MI' fundamental imaging mode is not available. LVO imaging mode does not allow perfusion assessment with the presently available UCA, requires a larger volume of contrast and apical artifacts are common.

Hampson et al. Echo Research & Practice
https://doi.org/10.1186/s44156-023-00034-9

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Optimization

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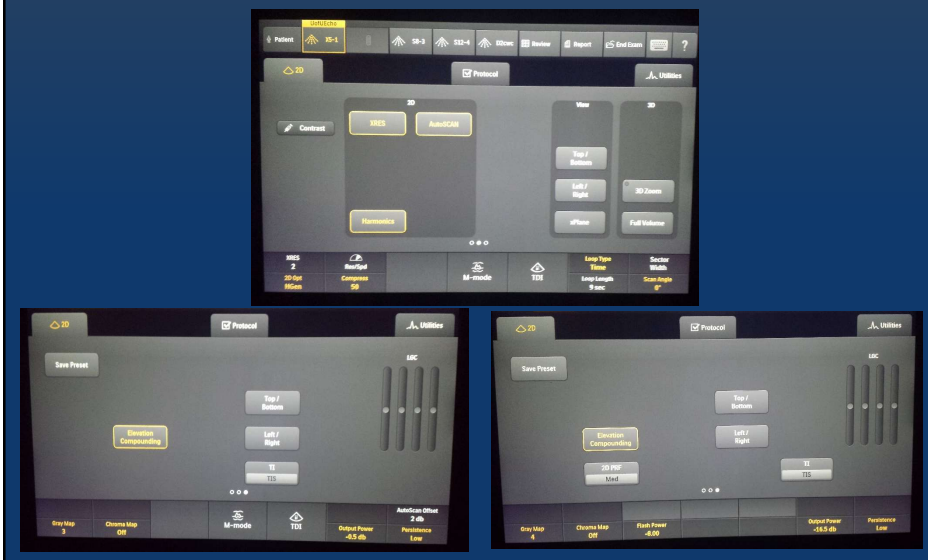
Optimization



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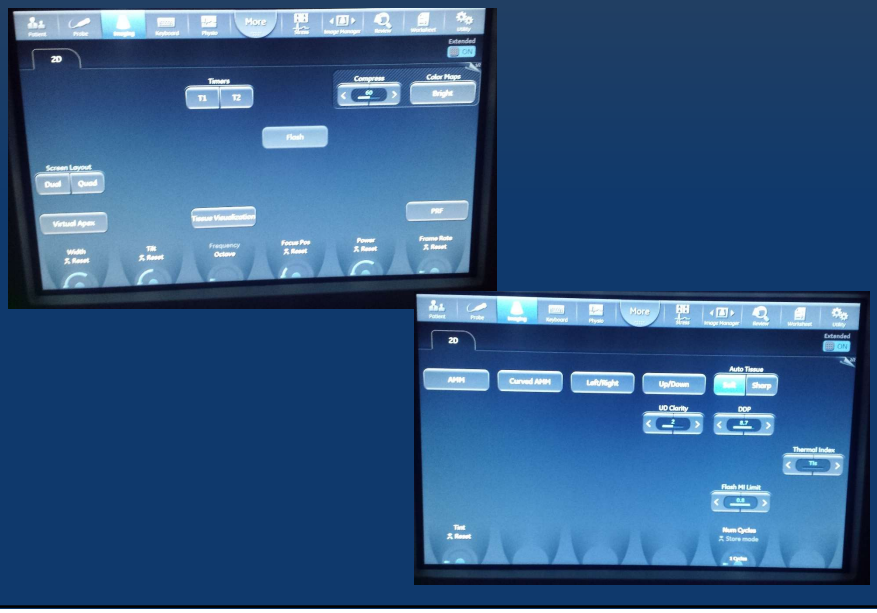
Optimization



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Optimization
3D

- Frame Rates in Full Volume and Live 3D
- Contrast LVO have higher frame rate compared to Contrast Low MI
- In Contrast LVO, Pen is single pulse harmonics
- Go to Absolute shallowest Depth possible
- Use Full Volume Option set to Frame Rate

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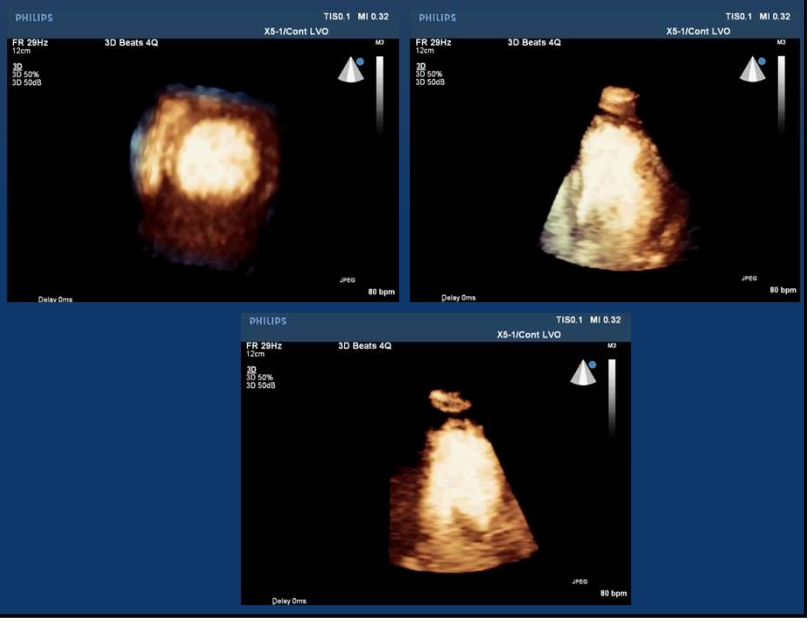
Optimization
3D



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Optimization Triggered

- In order to get replenishment information Trigger Beats must be changed manually during acquisition
- E.g., 1,2,4,8
- In Review Beats will be annotated on display

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Optimization Triggered

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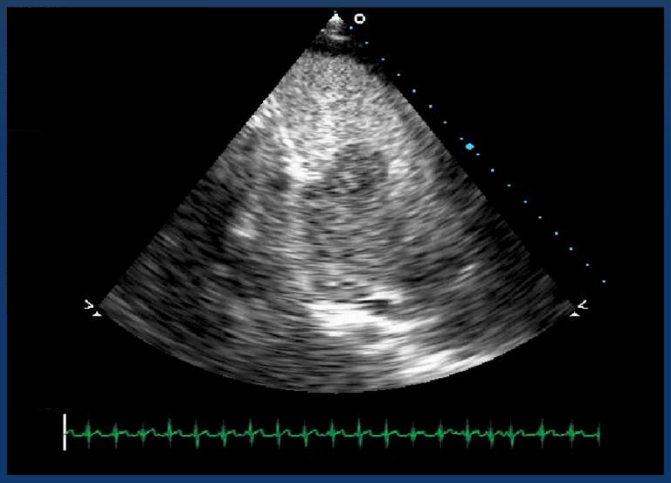
Optimization Triggered



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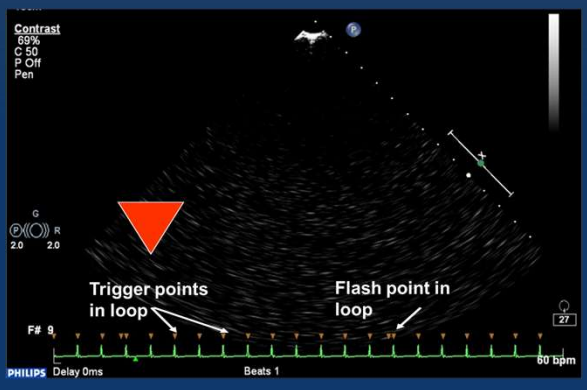
Contrast Optimization Triggered



Courtesy of Philips

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Contrast Optimization Triggered

How to synchronize Flash?

- Turn on ECG triggering
- ECG Delay controls where Flash ends
- 1 Frame gives TRI (TRI = Triggered Replenishment Imaging)
- 40 frames gives “real-time” imaging with synchronized Flash
- Allows visualization of wall motion

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Objectives

Safety and need:

- FDA Black Box
- PHTN
- Agitated Saline

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Black Box Warning

- "Sometimes echocardiograms in certain patients are difficult for physicians to see and interpret," said Libero Marzella, M.D., Ph.D., director of the Division of Medical Imaging Products in the FDA's Center for Drug Evaluation and Research. "Today's approval provides doctors with another option when performing contrast enhanced ultrasound."

ICUS Weekly News Monitor 10-17-2014
(ICUS Weekly News Monitors)

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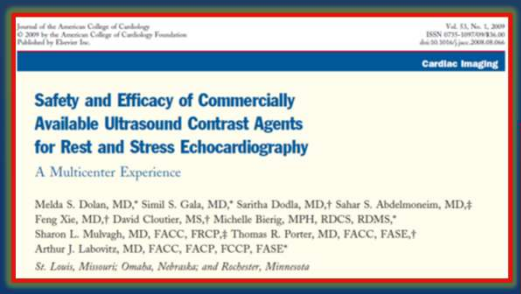
Black Box Warning



Cardiac Imaging

Safety and Efficacy of Commercially Available Ultrasound Contrast Agents for Rest and Stress Echocardiography

A Multicenter Experience

Melda S. Dolan, MD,* Simil S. Gala, MD,* Saritha Dodla, MD,† Sahar S. Abdelmoneim, MD,‡ Feng Xie, MD,† David Cloutier, MS,† Michelle Bierig, MPH, RDCS, RDMS,* Sharon L. Mulvagh, MD, FACC, FRCP,‡ Thomas R. Porter, MD, FACC, FASE,† Arthur J. Labovitz, MD, FACC, FACP, FCCP, FASE*

St. Louis, Missouri; Omaha, Nebraska; and Rochester, Minnesota

Conclusions

This study examined, in a large multicenter experience, the safety and incremental value of contrast use in the clinical practice of stress echocardiography. The risks of both short-term and long-term events, defined as nonfatal MI and death, after contrast administration are very low and are no different than in patients not receiving contrast during stress echocardiography. Contrast use in patients with suboptimal images improves feasibility and accuracy of stress echocardiography testing. Failure to use contrast agents in patients with suboptimal images may result in a misdiagnosis and/or additional alternative imaging tech-

1997: FDA Approval of contrast agents
2007: Black Box Warning
2008: Retrospective multicenter study

Dolan, Melda S., et al. "Safety and efficacy of commercially available ultrasound contrast agents for rest and stress echocardiography: a multicenter experience." Journal of the American College of Cardiology 53.1 (2009): 32-38.

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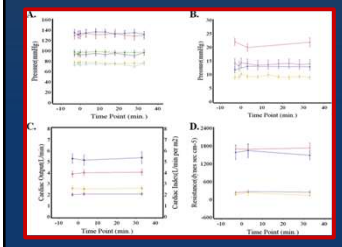
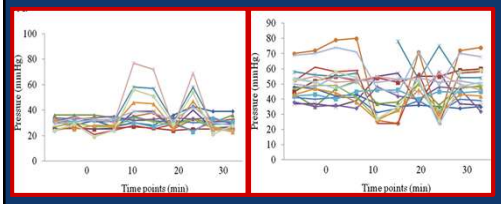
Contrast in PHTN





Prospective study:

N=32 (16 with >35mmHg)

1. **No significant changes in systemic or pulmonary hemodynamics**
2. **Non significant changes in and conduction intervals**
3. **No serious AE or deaths occurred**
4. **No change in safety assessments**

Wei, K. et al JASE 2012; 25 584-8

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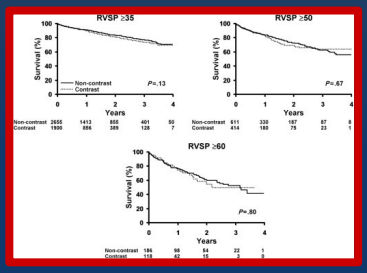
Contrast in PHTN



Retrospective

1900 subjects: ≥ 35 mmHg
414 subjects: ≥ 50mmHg
118 subjects: ≥ 60 mmHg

No significant differences with mortality and MI

No association between contrast related AE and RSVP

"The writing group recommends that if a contrast agent is needed to improve right ventricular opacification or LVO or Doppler enhancement in a patient with PHT, it should be used."

Journal of the American Society of Echocardiography 2014 27, 797-810DOI: (10.1016/j.echo.2014.05.011

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Adverse Effects

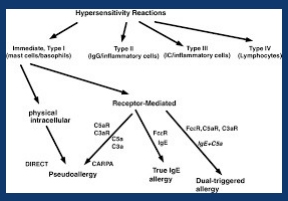
Key Point: No PRIOR sensitivity may have occurred. Can decrease in severity or even disappear with subsequent administrations.

Mechanism:
Occurs relatively frequently in liposomal drugs (e.g. Doxil, Amphotericin) up to 7%

Mild forms associated with palmar erythema and back pain.

Severe form associated with hypotension, bronchospasm, hypoxemia

Ability of lipid particles to produce CARPA (C' activation-related pseudoallergy) has been studied.



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Adverse Effects

Factors That Influence CARPA (C' activation-related pseudoallergy)

1. Surface charge
   - Most commercial lipid microbubbles possess a net charge
2. Lipid dose (particle surface area) and rate
   - All microbubbles (lipid, polymeric, albumin) have the potentioal to activate complement at their surface
3. Presence of non-ionic polymer at surface (polaxamer, PEG)
   - Many commercial lipid microbubbles have been designed with non-ionic polymer on the surface [polaxamer, PEG(polyethylene glycol)]

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Objectives

Comparison of agents

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UEA agents (2015)

- **Second generation contrast agents — Of the following second-generation contrast agents, three (Optison, Definity, and Lumason) are currently FDA approved:**

TABLE 1 – COMMERCIALLY AVAILABLE UEAS APPROVED BY THE U.S. FOOD AND DRUG ADMINISTRATION

Name	Manufacturer/vial contents	Mean diameter	Shell	Gas	Contraindications
Lumason (sulfur hexafluoride lipid-type A microspheres)	Bracco Diagnostics, 5 mL	1.5–2.5 μm (maximum 20 μm, 99% ≤10 μm)	Phospholipid	Sulfur Hexafluoride	Allergy to sulfur hexafluoride
Definity (perflutren lipid microsphere)	Lantheus Medical Imaging, 1.5 mL	1.1–3.3 μm (maximum 20 μm, 98% ≤10 μm)	Phospholipid	Perflutren	Allergy to perflutren
Optison (perflutren protein type-A microspheres)	GE Healthcare, 3.0 mL	3.0–4.5 μm (maximum 32 μm, 95% ≤10 μm	Human albumin	Perflutren	Allergy to perflutren/ blood products

1

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UEA agents

Table 2 Common problems and artifacts encountered when using IV contrast

Typical location of artifact	Artifact/problem	Sonographer correction method	Key additional points
Apex-endocardial border	Swirling	Use real-time very low MI imaging Increase contrast infusion rate (Video 7; available at www.onlinejase.com)	Lower frame rate prevents apical destruction; also can move focus to near field.
Apex-myocardium	Reduced contrast	Increase near-field TGC under resting conditions; move focus temporarily to near field (Video 8; available at www.onlinejase.com)	If resting wall motion is normal, perfusion should be normal, so a defect in this setting is an artifact.
Basal segment–myocardium	Reduced myocardial contrast	Additional foreshortened apical windows to get basal segments in the near field (Video 9; available at www.onlinejase.com)	If resting wall motion is normal, perfusion is normal, and therefore there should be no resting contrast defects in the absence of wall motion abnormalities. Use this concept in setting up receiver gain during resting images, because during stress, perfusion alone can be abnormal.
LV cavity contrast	Inadequate using a continuous infusion	Check IV site to ensure not obstructed; increase infusion rate; ensure contrast is not too dilute and is staying adequately mixed	Could switch to a small bolus.
LV cavity contrast	Shadowing of basal/mid segments	Slow down infusion or reduce bolus size and flush rate	Infusion (compared with bolus) reduces shadowing problems and allows more rapid correction of the problem.

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Establishing Policy:

How to Administer

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Establishing Policy:
How to Administer



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Establishing Policy:
How to Administer




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FDA: Agitated Saline

Table 3 Specific interventions during agitated saline injection designed to increase right atrial contrast and improve the detection of a PFO

Maneuver(s)	Specific intervention/timing	Mechanism
Add blood	10% blood added to 10% air and 80% saline	Produces smaller, more concentrated microbubbles
Cough, Valsalva maneuver, and abdominal compression	Performed during full RA opacification	Transiently increases RA pressure, creating RA-to-LA pressure gradient
Femoral vein injection	Performed instead of arm injection	IVC flow is directed to the IAS; SVC flow is directed to the TV

IAS, Interatrial septum; *IVC*, inferior vena cava; *LA*, left atrial; *RA*, right atrial; *SVC*, superior vena cava; *TV*, tricuspid valve.

	OHSU	Houston Methodist	Nebraska Medical Center	Mayo Clinic	University of Chicago	University of Utah
AGITATED SALINE ADM	SON/RN/FELLOW	SON/RN/FELLOW	RN	RN	SON/RN/FELLOW	SON/RN/FELLOW
Bacteriostatic 0.9%	YES	YES	NO	YES	NO	YES
Saline to air ratio	10 to 1	10 to 1	9 to 1	5 to 1	8 to 2	5 to 1
Outpt order	Written/Scan/EMR	Built into ordering	Built into ordering	Electronic	Built into ordering	Built into ordering
Inpt order	EMR	Built into ordering	Built into ordering	Electronic	Built into ordering	Built into ordering

Journal of the American Society of Echocardiography 2014 27, 797-810DOI: (10.1016/j.echo.2014.05.011

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FDA: Agitated Saline

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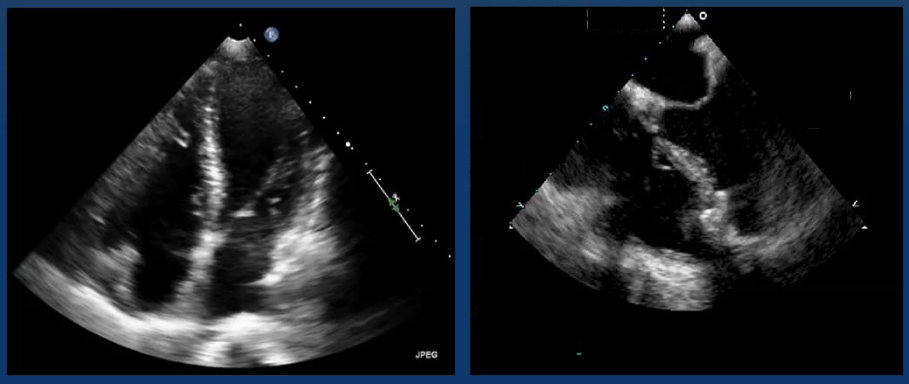
FDA: Agitated Saline



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Establishing Policy:
Cost

Here are the key reasons medical coding is essential:

Billing and Reimbursement:
.
Medical codes tell insurance companies what services were provided, allowing healthcare providers to receive proper payment for their work.
Standardization:
.
Coding provides a universal language for medical documentation, ensuring consistency in how patient information is recorded and shared across different healthcare providers and states.
Data Analysis and Research:
.
The standardized codes become valuable data points that researchers use to analyze healthcare trends, identify diseases, and plan for future public health needs.
Compliance:
.
Proper coding helps healthcare facilities adhere to complex regulations and reduces the risk of audits, penalties, or fraud associated with incorrect billing.
Accurate Patient Records:
.
By ensuring correct diagnoses and treatments are documented, medical coding contributes to maintaining the accuracy and integrity of patient medical records.
Improved Patient Outcomes:
.
The data generated from accurate coding can lead to better healthcare policies and the development of improved treatment options over time.
Communication:
.
Medical codes enable clear and concise communication of patient information between healthcare providers and insurance companies, reducing miscommunication and errors.

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Establishing Policy:
Cost

The International Contrast Ultrasound Society (ICUS) is the only global medical society exclusively devoted to promoting the safe and appropriate utilization of contrast-enhanced ultrasound (CEUS) where medically indicated, in order to improve patient care worldwide.

A strong and respected voice for the CEUS field, ICUS is at the forefront of CEUS education, advocacy and communications — providing a unique grassroots focus on the best interests of patients.

ICUS offers free CEUS educational programs, both live and via the internet, along with free access to all CEUS references on the ICUS website and CEUS updates in the Weekly News Monitors (in English and Mandarin). In addition, ICUS is a respected CEUS resource for policy makers, health care providers, other ultrasound professionals, the media and the public.

Founded in 2008, ICUS has grown to more than 4,000 members in 60 countries. Our diverse membership includes physicians, sonographers, nurses, scientists and other ultrasound imaging professionals, along with administrators, patients, the media and the public. Our members also bridge the fields of cardiology, radiology, vascular imaging, gastro-intestinal imaging, oncology, OB-GYN, hepatology and others medical subspecialties.

Sonographer Training Resource Hub

ICUS Archived Webinars

ICUS Educational Calendar - 2025

GETTING STARTED

- Finding an Agent
- How to set up a CEUS Lab
- Protocols
- Coding & Payment of CEUS
- ICUS Board Letter – Improved CPT Coding
- Liver Contrast in the Sonography Laboratory
- CEUS Calculator
- Sample UEA Policy and Procedures for Echo Labs
- CEUS cardiac exam protocols International Contrast Ultrasound Society (ICUS) recommendations

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Establishing Policy:
Cost

ICUS **MEDICARE CY 2025 CODING & PAYMENT FOR CEUS**

This document arrays Medicare coding & 2025 national average payment amounts for the use of contrast-enhanced ultrasound (CEUS) procedures in the United States. It neither interprets payer policy nor guarantees payment. Actual payments are site-specific and will differ from the examples here. Providers are solely responsible for accurate coding & billing.

Updated November 29, 2024	Non-Facility (Office/IDTF)						Facility (Hospital Outpatient Department)			
	CPT HCPCS	Description	Prof	TC	Global		CPT HCPCS	Description	APC	Description	Facility
NON-CARDIAC											
Non-cardiac ultrasound with contrast	76978	Ultrasound (US), targeted dynamic microbubble sonographic contrast characterization (non-cardiac); initial lesion	$ 73.75	$ 114.50	$ 188.25		76978	US, targeted dynamic microbubble sonographic contrast characterization (non-cardiac); initial lesion	5571	Level 1 imaging w contrast	$ 178.02
	76979	US, targeted dynamic microbubble sonographic contrast characterization (non-cardiac); each add'l lesion w separate injection *(Add-on code, list separately)*	$ 36.82	$ 80.87	$ 119.68		76979	US, targeted dynamic microbubble sonographic contrast characterization (non-cardiac); each add'l lesion w separate injection (List separately in addition to code for primary procedure)	5571	Level 1 imaging w contrast	$ -
CARDIAC											
TTE congenital anomalies	93303	Transthoracic echocardiography for congenital cardiac anomalies; complete	$ 58.22	$ 150.41	$ 208.63		C8921	Transthoracic echo w contrast, or w/o contrast followed by w contrast, for congenital cardiac anomalies; complete	5573	Level 3 imaging w contrast	$ 790.06
TEE congenital anomalies	93315	Transesophageal echo (TEE) for congenital cardiac anomalies; including probe placement, image acquisition, interp & report	$ 119.03	Carrier priced	N/A		C8926	TEE w contrast, or w/o followed by w contrast, for congenital cardiac anomalies; includ probe placement, image acquisition, interp & report	5573	Level 3 imaging w contrast	$ 790.06
TTE stress test	93350	TTE, real-time (RT) w image documentation (2D), includes M-mode recording, when performed, during rest & cardiovascular stress test using treadmill, bicycle exercise and/or pharmacologically induced stress, w interp & report	$ 65.34	$ 111.60	$ 176.93		C8928	TTE w contrast, or w/o followed by w contrast, RT w image doc (2D), m-mode recording, when performed, during rest & cardiovascular stress test using treadmill, bicycle exercise and/or pharma-induced stress, w interp & report	5573	Level 3 imaging w contrast	$ 790.06
Doppler	93320	Doppler echo, pulsed wave and/or continuous wave w spectral display; complete *(Add-on code, list separately)*	$ 17.47	$ 31.70	$ 48.52		C8929	TTE w contrast, or w/o followed by w contrast, RT w image documentation (2D), m-mode recording, when performed, complete, w spectral Doppler echo, & w color flow Doppler echo	5573	Level 3 imaging w contrast	$ 790.06
TTE w spectral Doppler	93306	TTE, RT w image documentation (2D), includes M-mode recording, when performed, complete, w spectral Doppler echo, & w color flow Doppler echo	$ 63.34	$ 122.59	$ 187.93		C8929	TTE w contrast, or w/o followed by w contrast, RT w image documentation (2D), m-mode recording, when performed, complete, w spectral Doppler echo, & w color flow Doppler echo	5573	Level 3 imaging w contrast	$ 790.06
TTE w/o spectral Doppler	93307	TTE, RT w image documentation (2D), includes M-mode recording, when performed, complete, w/o spectral or color Doppler echo	$ 41.40	$ 89.60	$ 131.00		C8929	TTE w contrast, or w/o followed by w contrast, RT w image documentation (2D), M-mode recording, when performed, complete, w/o spectral or color Doppler echo	5573	Level 3 imaging w contrast	$ 790.06
USE OF CONTRAST AGENTS											
Cardiac ultrasound w contrast (add on)	0439T	Contrast perfusion, at rest or w stress, to assess myocard ischemia or viability *(Add-on, list separately)*	N/A	N/A	Carrier priced		0439T	Contrast perfusion, at rest or w stress, to assess myocard ischemia or viability *(Add-on, list separately)*	N/A		Carrier priced
	93352	Use of contrast agent during stress echo *(Add-on code, list separately)*	N/A	N/A	$ 33.93		93352	Use of contrast agent during stress echo *(Add-on code, list separately)*	N/A		$ -

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Establishing Policy:
Cost

CONTRAST AGENTS		(ASP Q4 2024)	per ml	per vial					
Lumason® (Bracco)	Q9950	Inj, sulf hexa lipid microspheres, per ml, 5 ml single use vial	$ 18.65	$ 93.25	Q9950	Injection, sulfur hexafluoride lipid microspheres, per ml	N/A	Packaged	$ -
Optison™ (GE Healthcare)	Q9956	Inj, octafluoropropane microspheres, per ml, 3 ml single use vial	$ 40.92	$ 122.76	Q9956	Injection, octafluoropropane microspheres, per ml	N/A	Packaged	$ -
Definity® (Lantheus)	Q9957	Inj, perflutren lipid microspheres, per ml, 2 ml single use vial	$ 40.92	$ 81.84	Q9957	Injection, perflutren lipid microspheres, per ml	N/A	Packaged	$ -

C-Codes are illustrative. Hospital OP departments bill Original Medicare CB821-CB830 for echocardiography. Commercial payers & Medicare Advantage plans may not accept C-codes. If not, refer to CPT 93303.

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Establishing Policy:
Cost

Journal of the American College of Cardiology
© 2009 by the American College of Cardiology Foundation
Published by Elsevier Inc.

Vol. 53, No. 9, 2009
ISSN 0735-1097/09/$36.00
doi:10.1016/j.jacc.2009.01.005

EXPEDITED PUBLICATION

Impact of Contrast Echocardiography on Evaluation of Ventricular Function and Clinical Management in a Large Prospective Cohort

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Kurt, Mustafa., et al. "Impact of Contrast Echocardiography on Evaluation of Ventricular Function and Clinical Management in Large Prospective Cohort." Journal of the American College of Cardiology 53.9 (2009): 802-10.

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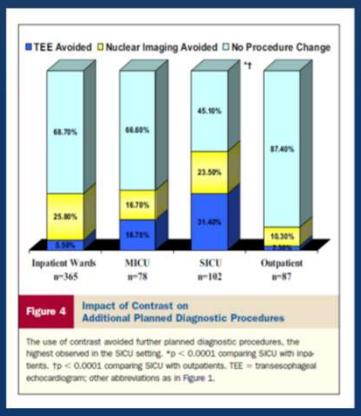
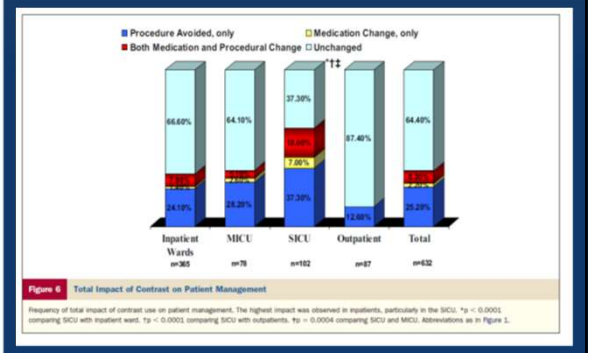
Establishing Policy:

Cost





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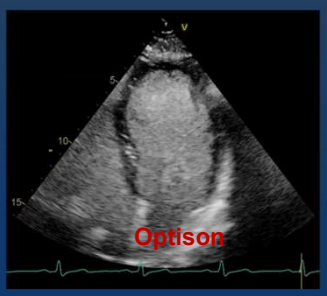
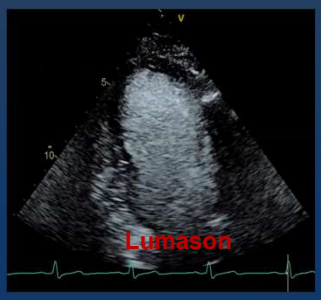
Contrast: Which is Which?





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